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The MomConnect mHealth initiative in South Africa: Early impact on the supply side of MCH services

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Abstract MomConnect is an mHealth initiative giving pregnant women information via SMS. We report on an analysis of the compliments and especially complaints component of the feedback. We scrutinised the electronic databases containing information on the first seventeen months of operation of MomConnect. During this time, 583,929 pregnant women were registered on MomConnect, representing approximately 46 per cent of pregnant women booking their pregnancy in the public sector in South Africa. These women gave feedback on services received: 4173 compliments and 690 complaints. Nearly three quarters (74 per cent) of all complaints were resolved. The complaints were classified into those related to health services (29 per cent), staff (22 per cent), health systems (42 per cent) and other (6 per cent). These complaints were fed back to managers in the health facilities. This has resulted in improvements in the quality of services, e.g. decreased drug stock-outs and change of behaviour of some health workers.
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Background

Following South Africa's introduction of a holistic campaign to deal with HIV in 2009, especially the prevention of mother to child transmission, there was an improvement in the drive to reach the Millennium Development Goals (MDG) targets for under-5 and maternal mortality (MDG goals 4 and 5 respectively).[1] It was clear,

however, that South Africa was still some way from achieving the targets. The South African Department of Health (DOH) introduced a range of health system interventions to improve the coverage and quality of health services. These included a new breastfeeding strategy in 2012[2] a national family planning campaign in 2013[3] and an mHealth intervention named "MomConnect" in 2014.

Over the past five years, with mobile phone use becoming ubiquitous, the use of mHealth interventions, including a range of initiatives aimed at improving maternal and child health,[4] has increased exponentially. In a discussion of its potential, Agarwal and Labrique state that "mHealth strategies may have the potential to improve neonatal survival by catalysing and improving the delivery of interventions of known efficacy, improving access to information, and modifying demand for quality services, plus enabling the provision of targeted care, where and when these benefits are needed the most".[5] Watterson et al. reviewed the literature in 2015. They found some evidence that mHealth can improve antenatal and postnatal care, and immunisation.[6] To get some standardisation, the World Health Organization recently published a checklist for the reporting of mHealth interventions.[7]

There are a number of challenges that need to be overcome to use mHealth successfully. These include scale-up and sustainability.[8–10] Demand-side barriers, for example, constrain the ability of women to seek care. They lack knowledge about their health and information about availability of health services. mHealth programmes such as the Aponjan programme in Bangladesh,[11] and the WazaziNipendeni programme in Tanzania[12] have tried to address demand-side barriers by providing women with information through Short Message Services (SMS).

Introduction of MomConnect

MomConnect, a DOH initiative launched in South Africa in August 2014, is the subject of several publications, including a case study written up by the United Nations Foundation.[13,14] MomConnect takes advantage of the fact that virtually every person in South Africa has access to a mobile phone.[15] The aims of MomConnect are to connect pregnant women to health services; to encourage pregnant women to

attend antenatal clinics as early as possible, preferably before 20 weeks of pregnancy; and to enable these women to interact with the health system. To improve service delivery, the last includes providing feedback on the quality of care received.

At antenatal clinics in the public sector, where there is virtually universal attendance, pregnant women are encouraged to register for MomConnect. Registration is linked to an electronic database and includes several variables: the woman's identification number; her mobile phone number; the estimated duration of pregnancy and a unique clinic identification number. Once registered, women receive free SMS linked to the stage of their pregnancy. They continue to receive messages postnatally, linked to the age of their infant, up to 1 year of age. We extracted relevant data for this paper from this database.

Apart from receiving messages, pregnant women can also interact in three ways with a health desk located in the DOH. The first is a rating system. The day after registration, each woman receives a simple survey consisting of five basic questions related to the quality of service received. These survey questions are based on the core standards of quality of the DOH[16] and include waiting time, cleanliness of the clinic, privacy and the attitude of the health worker with whom she interacted. The answers to this survey are sent via Unstructured Supplementary Service Data (USSD) at no cost to the respondent. The results are collected in a database located in the DOH.

Secondly, the women are able to ask for additional information around any topic relating to their pregnancy. These requests are in the form of SMS. These questions are received by a helpdesk located in the DOH. This helpdesk is open during working hours, staffed by a qualified nurse supported by two non-professional health workers. If the question is of a routine nature, an answer is pulled from a bank of standard answers to frequently asked questions. If the question indicates some urgency, the follow-up may be in the form of a telephone call to the woman, advising her to go to the clinic or hospital.

Thirdly, women can at any time log a complaint or compliment the service that they received, using an SMS message. This service is free to the women and the complaints or compliments are logged at the helpdesk located in the DOH. All complaints and compliments are sent to a focal point in the district to investigate the complaint or to communicate the compliment to the relevant health worker or facility. The district and facility have 10 days to investigate the complaint, take

remedial action where necessary and give feedback. If no feedback is received from the district or facility, the national helpdesk sends reminders and also escalates this to the provincial level. Every 2 months, a list of the complaints and the feedback related to them is sent to the provincial head of department.

It is this last component, namely the feedback from pregnant and postpartum women on the services that they receive, in particular the complaints, and the impact of this feedback on the quality of care that forms the focus of this paper. To the best of our knowledge, this feedback from pregnant women is unique in mHealth messaging systems for pregnant women in low- and middle-income countries.

Methodology

The general MomConnect data, pertaining, *inter alia,* to the registration and the facility at which pregnant women attended antenatal care, were extracted from the electronic database, located in the DOH. Other relevant data, such as the number of women attending antenatal clinics, were extracted from the DOH's routine data management system–the district health information system.

All complaints are electronically received via a proprietary system named "Snappy", which logs the complaints submitted to the helpdesk. Once a complaint is received it is dealt with and then manually entered into an Excel spreadsheet by the helpdesk manager. The complaints are linked to variables, including the date of the complaint, the facility and its location, the description of the complaint and its type, and the action taken to resolve the complaint, and the date of this action. The spreadsheet is updated weekly. We extracted relevant data from these spreadsheets from the launch of MomConnect in August 2014 to the end of January 2016. This paper reports an analysis of these complaints and the impact that these have had on the supply side of the health system.

Results

From the inception of MomConnect in August 2014 to the end of January 2016, a total of 583,929 pregnant women registered on MomConnect. This represents nearly half ($\sim$46 per cent) of all women

booking their pregnancy in the public sector. More than 95 per cent (3538) of all facilities dealing with pregnant women have recorded MomConnect registrations, indicative of the virtually universal roll out of MomConnect in South Africa.

Compliments and complaints

By the end of January 2016, six times as many compliments (4173) had been received than complaints (690), indicating that pregnant women are generally appreciative of the services received. However, the complaints generate much more action and response by the managers of health services.

The number of registrations and complaints and the proportions of each of these in each of the nine provinces in South Africa are summarised in Table 1.

Within the provinces, there is further disaggregation, in line with the organisation of the public health sector into 52 districts, and then to sub-district and finally to facility level, where the patient–provider interaction occurs. The North West and Gauteng provinces have disproportionately higher number of complaints relative to their registrations, while the Eastern Cape and KwaZulu-Natal registered relatively low numbers of complaints.

The district managers responsible for maternal and child health and the facility managers are primarily responsible for investigating the complaints and taking the appropriate remedial actions, including escalating the problem if it is beyond their capability to resolve. Table 2 presents the aggregate performance of the provinces in resolving the complaints. Most of the provinces are relatively active and successful in taking action to resolve complaints, with seven of the nine provinces resolving 70 per cent or more of their complaints. The Western and Eastern Cape provinces stand out with resolution rates below 50 per cent.

Each of the complaints is classified into one of four categories: service related (e.g. long waiting times), staff related (e.g. attitudes of health workers), health systems (e.g. drugs out of stock) and other. The results of this are shown in Table 3. All of the provinces registered between 20 per cent and 40 per cent of complaints being service related, with the exception of the Northern Cape, with very low numbers of complaints, being an outlier with 62.5 per cent. Health systems issues

Table 1: Numbers and proportions of registrations and complaints August 2014 to January 2016, by province

Province	*Registrations*		*Complaints*	
	Number	*%*	*Number*	*%*
Eastern Cape	51,944	8.9	37	5.4
Free State	26,846	4.6	34	4.9
Gauteng	131,925	22.6	192	27.8
KwaZulu-Natal	125,797	21.5	114	16.5
Limpopo	81,259	13.9	113	16.4
Mpumalanga	67,875	11.6	57	8.3
Northern Cape	8,042	1.4	8	1.2
North West	49,105	8.4	91	13.2
Western Cape	33,941	5.8	40	5.8
Not allocated	7,195	1.2	4	0.6
South Africa	583,929	100.0	690	100.0

Table 2: Number of complaints, August 2014 to January 2016, by level of resolution and province

Province	*Resolved*		*Not resolved*		*Closed, not resolved*		*Total*
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*
Eastern Cape	16	43.2	20	54.1	1	2.7	37
Free State	25	73.5	4	11.8	5	14.7	34
Gauteng	133	69.3	59	30.7	0	0.0	192
KwaZulu-Natal	83	72.8	31	27.2	0	0.0	114
Limpopo	107	94.7	6	5.3	0	0.0	113
Mpumalanga	45	78.9	9	15.8	3	5.3	57
North West	75	82.4	14	15.4	2	2.2	91
Northern Cape	7	87.5	0	0.0	1	12.5	8
Western Cape	16	40.0	19	47.5	5	12.5	40
Not allocated	4	100.0	0	0.0	0	0.0	4
South Africa	511	74.1	162	23.5	17	2.5	690

comprise 42.5 per cent of all complaints, reflecting the importance of the availability of drugs and vaccines to the users of the government or public health sector.

Illustrative examples of actual complaints lodged and subsequent actions taken to resolve them are presented in Table 4. Each complaint is actively followed up by the helpdesk manager and the spreadsheet is updated on a regular fortnightly basis. A complaint was classified as resolved if the complaint was investigated by relevant managers, specific action taken if necessary, and the user contacted and informed.

Table 3: Number of complaints, August 2014 to January 2016, by type and province

Province	*Service Related*		*Staff related*		*Health systems*		*Other*		*Total*
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*
Eastern Cape	10	27.0	5	13.5	15	40.5	7	18.9	37
Free State	10	29.4	8	23.5	10	29.4	6	17.6	34
Gauteng	56	29.2	49	25.5	72	37.5	15	7.8	192
KwaZulu-Natal	35	30.7	35	30.7	38	33.3	6	5.3	114
Limpopo	27	23.9	26	23.0	58	51.3	2	1.8	113
Mpumalanga	17	29.8	14	24.6	25	43.9	1	1.8	57
North West	34	37.4	12	13.2	44	48.4	1	1.1	91
Northern Cape	5	62.5	1	12.5	2	25.0	0	0.0	8
Western Cape	9	22.5	2	5.0	29	72.5	0	0.0	40
Not allocated	0	0.0	0	0.0	0	0.0	4	100.0	4
South Africa	203	29.4	152	22.0	293	42.4	42	6.1	690

Table 4: Examples of complaints made and subsequent action taken by health services to resolve issues

Date	*Nature of complaint*	*Province*	*Actions taken to resolve complaints*
24/02/2015	Baby vaccinations are out of stock	Eastern Cape	On looking at the bin cards it was found that these drugs were out of stock between these dates: • Polio – since 30 January 2015 to 27 February 2015 - about a month • Pentaxim between 5/02/2015 and 12/02/2015 which is 7 days. Other vaccines checked were Rotavirus, Measles and Hepatitis B found to be overstocked The sub-district pharmacist was contacted to move drugs to the Health Centre immediately
27/04/2015	Services extremely poor. Long waiting times from 0645 am to 1600 pm	Limpopo	Resolved on the 25/06/2015 The patients to be given reports from time to time about the delays so that they are all on board with the situation; revisit reallocation of staff as the clinic get busy
23/04/2015	Nurses have ran out of pills	North West	Resolved. Management did a redress meeting with staff and were made aware of ordering medication on time and inform the HOD's if meds are out of stock

Discussion

MomConnect is a relatively new intervention that uses mHealth to improve both the demand for health services and, through feedback mechanisms, the quality of the supply side as well. Six times as many women were complimentary about the health messages and services that they received, compared to those who complained. In several districts, the same facility received more complaints. All facilities having three or more complaints were highlighted and pointed out to the relevant managers, including the provincial head of health.

These complaints helped pinpoint deficiencies in the health system. Some of these complaints are local and relevant to a particular health worker or facility, such as rudeness and shouting at patients. These led to remedial action being taken with particular staff at particular health facilities.

Other complaints are more systemic in nature, such mortality due to iron deficiency. Anaemia contributes to mortality from obstetric haemorrhage, one of the most important causes of maternal mortality[17] in South Africa. Providing iron supplements to every pregnant woman is one of the key interventions of antenatal care services. MomConnect complaints have had the effect of ensuring that in at least two provinces, Gauteng and North West, reports of iron supplementation shortages at particular clinics led to improvements in the drug management system (e.g. overall stock re-ordering systems at facility level), not only in the particular clinics but also in the district and province at large. At the national level, weekly reports of specific facilities which had a medicine or vaccine stock-out related complaint are sent to the national managers in charge of pharmaceutical services and the Expanded Programme on Immunisation. These managers then look at the issue from a national perspective to see if there are system-wide issues that need resolution. Drug shortages are investigated and remedied both from a bottom up (facility) level as well as from a top down (system-wide) perspective.

The feedback mechanisms from the DOH to the provincial, district, and facility managers took some time to establish. Resolution of complaints improved substantially over time, with a greater proportion of complaints attended to and resolved in the second six months of the programme than in the first six months.

Direct feedback, via compliments and complaints, from users of the system, is potentially useful for users and providers alike. It provides direct feedback of the perceived quality of service and augments the government's own system for review of quality via the recently established Office of Standard's Compliance. This gives users the sense that they have a voice, especially as the helpdesk contacts them to check whether they were satisfied with the follow-up. This system also gives feedback to providers on whether they are doing well. Most health providers get professional satisfaction from receiving a compliment. It also provides an indication of where there are shortcomings in the system, which are usually relatively easily remediable.

There are a number of limitations to this study. The definition of whether a complaint is resolved is open to interpretation. This may account for an over-estimation of the resolution rate. There are a small number of complaints relative to the numbers of women registered, with the potential for some bias in the type of complaints made.

Recommendations

This analysis suggests areas in which the programme could improve and has implications for health system policy. Health workers, specifically nurses dealing with pregnant and postpartum women should be supported and empowered to deal with complaints. mHealth is an ideal medium to do this and MomConnect could be extended to provide nurses with information and motivation for providing better quality of care.

Currently most attention is given to complaints. Compliments should be used as a motivator of nurses and compliments should be directed specifically to the facility/health worker to whom they are related. In addition MomConnect should be extended to empower nurses by giving them access to useful information related to pregnancy, child health and family planning. It should also give them a route to give feedback about the facilities at which they work, as sometimes issues are beyond their scope to influence.

For those women who have smartphones, and their numbers are increasing exponentially, MomConnect should be tailored so that more information is available on a cell phone optimised website. MomConnect should also be tailored to enable greater interaction between the helpdesk and the women through the use of data services that are far

less cumbersome than SMSs. The effect of this, however, may be detrimental to equity, as users at the low end of the socio-economic spectrum will probably be the last to get smart phones.

Conclusion

During the short time since the launch of MomConnect, it has been able to register nearly half of all pregnant women in the country and they are enthusiastic about the benefits of being registered. Quality of care provided has improved, especially in the area of drug shortages and stock-outs. Managers at all levels have been made more accountable for the direct complaints made by the beneficiaries of the services. Can this be a mechanism for improving the overall standard of health service provided and ultimately to impact the health of pregnant women and their newborn children? MomConnect also has the potential to field complaints from users of the health system outside of maternal and child health. It can thus make a difference to the overall quality of care of the primary health care system.

About the Authors

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References

1. Pillay, Y. and Barron, P. (2014) Progress towards the Millennium Development Goals in SA. *South African Medical Journal* *104*(3 Suppl1): 223. doi:10.7196/SAMJ.7924.
2. National Department of Health, South Africa. (2013) *Infant and Young Child Feeding Policy, Pretoria*. http://www.health-e.org.za/wp-content/uploads/2013/09/IYCF_Policy_2013.pdf, accessed 26 March 2016
3. National Department of Health, South Africa. (2012) *Contraception & Fertility Planning Policy and Guidelines, Pretoria*. https://ndoh.dhmis.org/owncloud/index.php/s/R5cmdpogY4Fa43Z?path=%2FContraception%20and%20Fertility%20Planning%20Policy, accessed 26 March 2016
4. Tamrat, T. and Kachnowski, S. (2011) Special delivery: An analysis of mhealth in maternal and newborn health programs and their outcomes around the world. *Maternal and Child Health Journal* *16*(5): 1092–1101.
5. Agarwal, S. and Labrique, A. (2014) Newborn health on the line: the potential mHealth applications. *JAMA* *312*(3): 229–230. doi:10.1001/jama.2014.6371.
6. Watterson, J., Walsh, J. and Madeka, I. (2015) Using mHealth to improve usage of antenatal care, postnatal care, and immunization: A systematic review of the literature. *BioMed Research International* *2015*: 1–9. doi:10.1155/2015/153402.
7. Agarwal, S., LeFevre, A., Lee, J., L'Engle, K., Mehl, G., Sinha, C. and Labrique A for the WHO mHealth Technical Evidence Review Group. (2016) Guidelines for reporting of health interventions using mobile phones: mobile health (mHealth) evidence reporting and assessment (mERA) checklist. *BMJ* 352: i1174, doi: 10.1136/bmj.i1174
8. Tomlinson, M., Rotheram-Borus, M. J., Swartz, L. and Tsai, A. C. (2013) Scaling up mHealth: Where is the evidence? *PLoS Med* *10*(2): e1001382. doi:10.1371/journal.pmed.1001382.
9. Leon, N., Schneider, H. and Daviaud, E. (2012) Applying a framework for assessing the health system challenges to scaling up mHealth in South Africa. *BMC Medical Informatics and Decision Making* *12*: 123. doi:10.1186/1472-6947-12-123.
10. Ngabo, F., Nguimfack, J., Nwaigwe, F., Mugeni, C., Muhoza, D. and Wilson, D. R., et al. (2012) Designing and Implementing an Innovative SMS-based alert system (RapidSMS-MCH) to monitor pregnancy and reduce maternal and child deaths in Rwanda. *Pan African Medical Journal* *13*: 31.
11. Rajan, R., Raihan, A., Alam, M., Agarwal, S., Ahsan, A., Bashir, R., Lefevre, A., Kennedy, C. and Labrique, A. (2013) MAMA 'Aponjon' Formative Research Report. Johns Hopkins University Global mHealth Initiative: Baltimore, MD, USA. http://www.mobilemamaalliance.org/sites/default/files/MAMA%20Bangladesh%20Formative%20Research%20Report.pdf, accessed 4 December 2015
12. Mendoza, G., Okoko, L., Morgan, M. and Konopka, S. (2013) mHealth Compendium, Volume Two. Arlington, VA: African Strategies for Health project, Management Sciences for Health. http://www.jhsph.edu/departments/international-health/_documents/USAIDmHealthCompendiumVol2FINAL.pdf, accessed 4 December, 2015

13. United Nations Foundation. (2016) MomConnect: Launching a National Digital Health Program in South Africa. Geneva. http://www.health.gov.za/index.php/mom-connect-docs, accessed 28 March 2016
14. Peter, J., Barron, P. and Pillay, Y. (2016) Using mobile technology to improve maternal, child and youth health and treatment of HIV patients. *South African Medical Journal* 106(1): 3–4. doi:10.7196/SAMJ.2016.v106i1.10209.
15. Pew Research Center. (2015) Cell Phones in Africa: Communication Lifeline. Washington, DC: Pew Research Center. http://www.pewglobal.org/2015/04/15/cell-phones-in-africa-communication-lifeline/, accessed 4 December 2015
16. National Department of Health, South Africa. (2011) "Towards Quality Care for Patients" National Core Standards for Health Establishments in South Africa. Department of Health. Pretoria. http://www.rhap.org.za/wp-content/uploads/2014/05/National-Core-Standards-2011-1.pdf, accessed 6 December, 2015
17. National Department of Health, South Africa. (2015) Saving Mothers 2011-2013: Sixth report on confidential enquiries into maternal deaths in South Africa – Short report. Pretoria. http://www.health.gov.za/index.php/shortcodes/2015-03-29-10-42-47/2015-04-30-08-18-10/2015-04-30-08-24-27, accessed 8 April 2016

Editors' Note

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